



**IMPLEMENTATION OF THE MILITARY HANDBOOK 17
FOR POLYMER MATRIX COMPOSITES AND
METAL MATRIX COMPOSITES**

August 1 - 31, 1994

Contract No. DAAL01-93-C-4064

Technical Progress Report

MSC TPR 3457/CA07

October, 1994

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U.S. Army Research Laboratory - Watertown, MA

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Date of Determination: 9/14/93. Other requests should be referred to U.S. Army Research Laboratory,
Attn: AMSRL-MA-S (Mr. Edward Clegg), 405 Arsenal Street, Watertown, MA 02172-0001.

DTIC QUALITY INSPECTED 5

Submitted By:

Crystal H. Newton
Principal Investigator



Prepared For:

Department of the Army
U.S. Army Research Laboratory
Arsenal Street
Watertown, MA 02172-0001

94 10 0001 9



Materials Sciences Corporation

October 6, 1994

MSC TPR 3457/CA07

Army Research Laboratory
AMSRL-MA-S
405 Arsenal Street
Watertown, MA 02172-0001

RE: Item No. A001, Contractor's Progress, Status & Management Report, Implementation of the Military Handbook 17 for Polymer Matrix Composites and Metal Matrix Composites, Contract No. DAAL01-93-C-4064, Technical Progress Report, MSC TPR 3457/CA07 - August, 1994

Enclosed are two copies of our Technical Progress Report for the period August 1 - 31, 1994. This is in accordance with CDRL A001.

If you have any questions or comments on the contents of this report, please let me know.

Sincerely,

Crystal H. Newton, Ph.D.
Project Engineer

CHN/mj

Enclosure (2/0)
DD250

cc: AMSRL-OP-PR-WT (1/0)
DTIC-FDA (1/0)

Accession For	
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Unannounced	<input type="checkbox"/>
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1. MILESTONE PROGRESS

Changes between the DoD Coordination review draft of MIL-HDBK-17-1D, MIL-HDBK-17-2C, and MIL-HDBK-17-3D were reviewed. These changes will be made to the WordPerfect files for the DoD coordination draft. The revised files will represent the WordPerfect files for the released handbook and will be submitted to ARL. An editorial revision of the compression section (Volume 1, Section 6.6.3) has been planned to reflect the change in ASTM test methods. ASTM test method D3410, to date, has included three test methods - Celanese, IITRI, and sandwich beam. The sandwich beam method is being pulled out into a new document which has now passed ASTM society ballot. This editorial revision is primarily changing test method numbers and splitting the section on ASTM D3039 into two sections.

Data analysis has been completed on the AS4/3502 modulus data. Reports on the analysis and technical review of these data were distributed to the working group. A distribution was also made to the Structural Joints working group.

Progress continues on the preparation of revised and new sections from the 27th (Portle), 28th (Alexandria), and 29th (Monterey) meetings for inclusion in the handbook. Authors and working group chairmen are being contacted as necessary to resolve issues such as editorial changes and placement in the handbook.

Two data sets for IM7G/8552 tape and towpreg, without documentation, were received. These were identified as data files CE0053 and CE0054. These data sets were identified as being candidates for data pooling. The spreadsheet files of the data were sent to Mark Vangel, chairmen of the Statistics working group for consideration. The Data Pooling task group met via conference call to address data pooling methodology. Sam Garbo and Joe Soderquist raised the possibility of a workshop on regression analysis for handbook data and qualification programs. In order to address this issue, a data set which has five test temperatures at the same moisture condition is desirable. None of the MIL-HDBK-17 data satisfy this criterion. The issue will be presented to the Data Pooling Task Group.

In preparation for the Fall MIL-HDBK Meeting, a briefing was held at ARL on 23 August 1994. A summary of this meeting is included as Appendix A. During this meeting the publication for the next revision of the handbook was established as a full revision (all three volumes) to be prepared for DoD coordination review which would include all revisions to the outline approved during the Spring 1995 meeting. The handbook outline and progress report have been updated based on sections approved from Monterey proceedings. Based on discussions at the briefing, the working group chairmen were contacted by email or facsimile with the executive session agenda, and requests for agenda item descriptions and milestones.

2. PROGRESS ADDRESSING IDENTIFIED CONCERNS

The data pooling task group continues to address methodology to eliminate a barrier for getting data approved for inclusion in the handbook.

3. MANAGEMENT CHANGES

No management changes were made during this contract period.

4. SCHEDULING CONCERNS

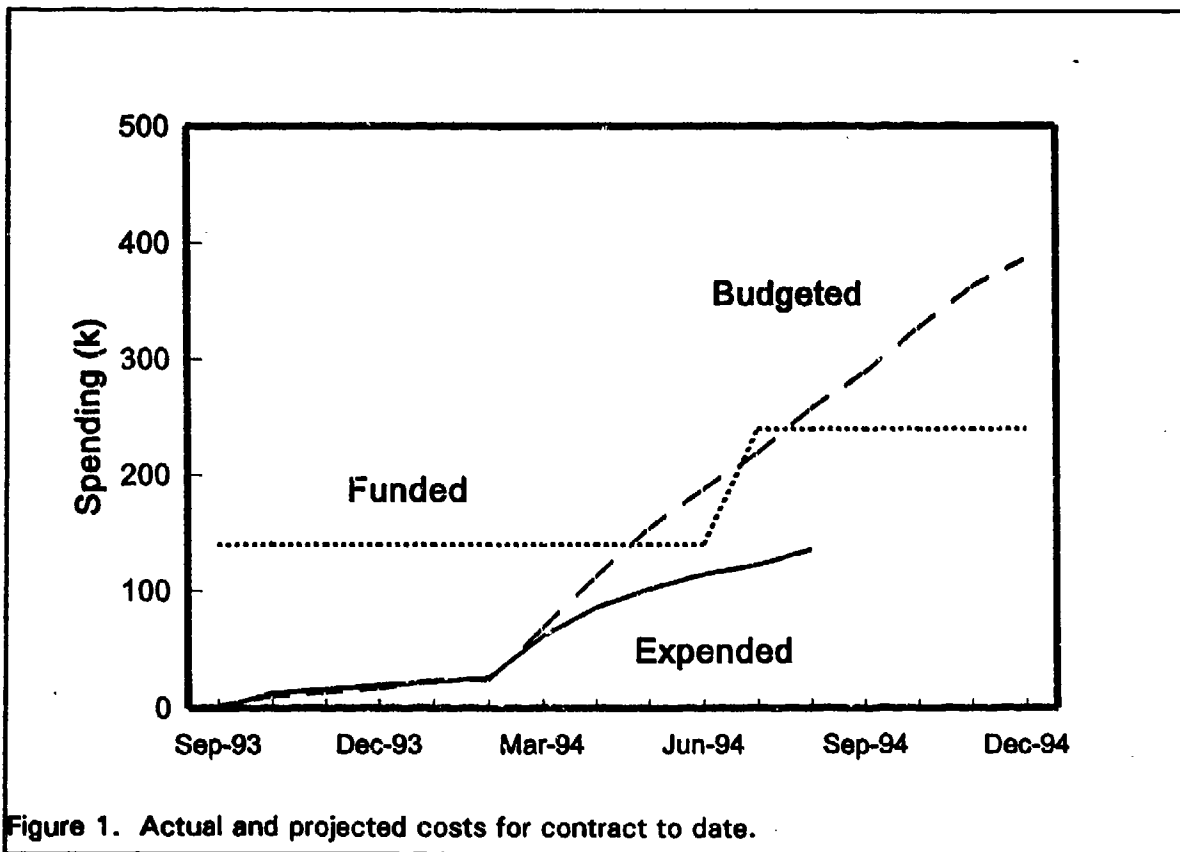
No changes in scheduling concerns arose during this contract period.

5. COST ELEMENT CONCERNS

The budget has been revised to reflect the funding included in Contract Modification 0003.

6. COST STATUS

The cost status from the contract start date through this reporting period is shown in Figure 1.



7. COST REPORT

The costs incurred during this reporting period and the total contractual expenditures as of 31 August 1994 are shown in the following table:

TABLE 1. Contract Cost Chart

	Reporting Period Costs	Cumulative Costs
Labor	\$12,736	\$115,001
Travel	\$451	\$6,849
Other Direct Costs	\$0	\$486
Subcontract	\$0	\$0
Other	\$0	\$13,453
Total	\$13,187	\$135,789

8. LABOR

The person-hours incurred during this reporting period and the total contractual expenditures as of 31 August 1994 are shown in Table 2:

TABLE 2. Labor status.

	Reporting Period	Cumulative
Person-hours	170	1,457

9. TRAVEL REPORT

Crystal H. Newton traveled to the U. S. Army Research Laboratory - Watertown for the pre-meeting briefing on 23 August 1994. The summary of that meeting is included as Appendix A.

10. SIGNIFICANT COMMUNICATIONS

a. Significant Letters

The following letters were mailed or received during this reporting period:

MIL-HDBK-17 Project Letters (Sent) Log			
Date	Addressee	File	Topic
8/09/94	Christensen, Steve		STAT17 3.1b
8/19/94	Data Review working group	(CE0051) (CE0052)	Distribution - CE0051/CE0052
8/19/94	Structural Joint working group	(Working group distributions)	Distribution

MIL-HDBK-17 Project Letters (Received) Log			
Date	Sender	File	Topic/Notes
8/01/94	DODSSP		Volumes 1 & 3 in less than great shape
8/01/94	Hart, Bernie		Volumes 1, 2, & 3
8/01/94	Hanson, Gary	(CE0053,CE0054)	IM7G/8552 tape and towpreg data
8/11/94	Shyprykevich, Peter		Distribution and agenda for Structural Joints working group
8/16/94	Welch, Doug		STAT17 registration
8/19/94	Shyprykevich, Peter	(Structural Joints)	Oplinger's section and revised cover memo for working group distribution

b. Significant Telephone Contacts

The following significant telephone contacts occurred during this reporting period:

MIL-HDBK-17 Phone Log:		
Date	Contact(s)	Topic/Notes
8/01/94	Adelmann, John	1-6.6.1.1 is deleted, 6.6.5 title shear tests, no input on MOL criteria, data pooling OK early week of 8/22
8/01/94	Hart, Bernie	Received package
8/01/94	Soderquist, Joe	Find data set with 5 temperatures at same condition, workshop at meeting with Doug Ward, John Adelmann & CHN to use regression, (data received from Hercules priority), CHN to check for appropriate data set, JS to talk to Doug Ward (suggestion per JS & Sam Garbo)

MIL-HDBK-17 Phone Log:

Date	Contact(s)	Topic/Notes
8/01/94	Wilcox, Karen	Please fax Dale Moore a meeting announcement
8/03/94	Jackson, Steve	Needs official letter noting approval of data for MIL17, CHN to draft and forward to Gary Hagnauer, completion of data transfer of stress-strain curves will be early October
8/05/94	Kipp, Tom	Received Vol 2 for DODSSP with missing Packet, some C/BMI's are C/Ep.
8/09/94	Christensen, Steve	Questions regarding transfer of data from QuatroPro to STAT17, needs latest version
8/09/94	Fields, Rich	Missing three references in text of 6.6.5
8/09/94	Smith, Bob	Missing text in 3-2.5.9 Adhesive bonding
8/11/94	Bode, John	Figures for 3-7.2.3 Photos were sent to Joe Brennan - ARL with draft dated 1/94, Figure 7.2.3.2.2 is from Swanson, CHN to request good copy with figure release
8/11/94	Hendrix, Jeff	Discussion of USACA involvement in Forum, may not be able to have a rep there but definitely interested, will discuss during Structural Ceramics meeting 9/29 am
8/11/94	Toth, Joe	Martin - Baltimore, fan reverser laminates, allowable Goebel method for calculating
8/12/94	Fields, Rich	References for shear section, Goebel method, RF will call Mark Vangel
8/12/94	Hart, Bernie	BH will coordinate date at ARL at meeting, BH will check for Bode's photos, CHN to send meeting booklet information to Karen Wilcox
8/12/94	Roylance, Margaret	Outtime definition, batch redefinition, reorganization and focus of 3-2
8/12/94	Soderquist, Joe	Briefing scheduled at ARL, schedule for release of handbook - change notice, proceedings in usual form, next meeting in Reno, CHN to put letters of appreciation on briefing agenda
8/15/94	Hart, Bernie	Briefing at ARL 10:00 am Aug 23

MIL-HDBK-17 Phone Log:

Date	Contact(s)	Topic/Notes
8/16/94	Shyprykevich, Peter	Hold Structural Joints working group distribution for Oplinger's chapter
8/16/94	Wilcox, Karen	What to expect for program, CHN to talk to GH regarding MMC, MSC to provide working group agendas, MIL-HDBK-17 agenda items, outline and progress report
8/17/94	Adelmann, John	Will fax agenda today, will handle working group distribution if necessary, CHN to send labels
8/18/94	Hagnauer, Gary	MMC agendas to be covered by GH
8/19/94	Garbo, Sam	Go ahead with workshop if task group feels there is some intrinsic value
8/19/94	Soderquist, Joe	Data OK for regression workshop? Check Sam Garbo
8/19/94	Ward, Doug	Append high temp MOL section as subsection, regression data
8/22/94	Camponeschi, Gene	Editorial revision of compression section, will attend ISO not MIL-17, Terry Morton will represent Navy
8/22/94	Fields, Rich	Will have schema workshop at MIL-HDBK-17 meeting, Shear figures
8/22/94	Shyprykevich, Peter	Check on receipt of Oplinger's section, distribution mailed Friday
8/22/94	Vangel, Mark	Need agenda
8/24/94	Banisaukas, John	Questions regarding Forum - concern re: sufficient time
8/24/94	Hart, Bernie	BH to fax executive meeting agenda
8/24/94	Sanders, Steve	Update on comments on electrical, thermal properties
8/25/94	Christiansen, Steve	Walk-through getting Lotus data into STAT17
8/25/94	Data Pooling conference call	Discussion on statistical & engineering criteria to pool data, MV to draft statistical criteria, SR to draft engineering criteria, CHN to send MV data for FAW pooling

MIL-HDBK-17 Phone Log:

Date	Contact(s)	Topic/Notes
8/25/94	Vandiver, Terry and Jaklitsch, Don	Organization of 1-2.5
8/25/94	Wooster, Linda	Distribution on monthly reports and data diskettes
8/29/94	Connolly, Jerome	Will send agenda by noon on Wednesday, will discuss milestones and chair situation at meeting
8/29/94	Vandiver, Terry	Questions on ASTM test methods, Discussion on location of filament winding information in handbook
8/30/94	Hansen, Gary	Willing to present info on national coordination plan, CHN to send agenda
8/31/94	Adelmann, John	Update on working group addresses, regression
8/31/94	Marian, Teresa	Touch base on MIL-17, will not be able to attend Fall meeting

c. Significant Electronic Mail Contacts

The following electronic mail was received or sent during this reporting period:

MIL-HDBK-17 Project E-Mail (Sent) Log

Date	Addressee(s)	File	Topic/Notes
7/11/94	Long, Mike		Data received, format fine

MIL-HDBK-17 Project E-Mail (Received) Log

Date	Sender(s)	File	Topic/Notes
8/03/94	Dart, Jim	T90CRTD.DAT	30 blocks of data - tape 90 degree Compression RTD
8/03/94	Vangel, Mark		Waiting for data, will be in Boston week of 9/8
8/03/94	Berkowitz, Harvey		Will MMC schedule be revised to permit attendance at Forum
8/03/94	Dart, Jim	FT18C.DAT	Fabric - 180 tension

MIL-HDBK-17 Project E-Mail (Received) Log			
Date	Sender(s)	File	Topic/Notes
8/08/94	Pasternak, Bob	RP19950808.IML	Data Review working group agenda
8/08/94	Vangel, Mark		Files overwritten, MSC will resend data
8/09/94	Ziolko, Glen	GZ19940808.IML	Questions and concerns from Glen and John Barnes re: forum
8/11/94	Evans, Patty	PE19940810.IML	Questions regarding National Initiative for Product Data Exchange and Forum
8/15/94	Vangel, Mark		Data problem with file IM78552T.WR1, CHN to check original file
8/19/94	Vangel, Mark	MV19940819.IML	What is correlation between panels and batches for IM7/8552 data?
8/19/94	Vangel, Mark		What is normalization of data for IM7/8552 data?
8/23/94	Fields, Rich	FIG7.EPS	Shear Figure 7 as an encapsulated PostScript file, Has converter that seems to work
8/24/94	Reeve, Scott		Data pooling - guidelines for each data scenario by Data Review as the scenarios arise. Documented so each becomes baseline for similar scenarios
8/25/94	Fields, Rich	FIG4.EPS, FIG5.EPS, FIG6.EPS	Shear figures 4, 5, 6
8/29/94	Kipp, Tom	TK19940829.IML	Announcement and minutes of ad hoc schema meetings

d. Significant Facsimile Contacts

The following facsimile mail was received or sent during this reporting period:

MIL-HDBK-17 Project FAX's (Sent) Log		
Date	Addressee(s)	Topic/Notes
8/01/94	Wilcox, Karen	List of forum people to get meeting announcements
8/12/94	Roylance, Margaret	Batch and Outtime definitions
8/24/94	Working group chairmen	Agenda for executive meeting, milestones, and agenda items
8/24/94	Clegg, Ed	Suggestions for letters/certificates of appreciation for working group chairs
8/25/94	Data Pooling task group	Preliminary results for AS4/3502 data

11. ENGINEERING CHANGE PROPOSAL STATUS

No engineering change proposals are outstanding at this time.

12. CONTRACT SCHEDULE STATUS

Schedule and requirements for the database for handbook data have not yet been resolved. The inclusion of all raw data in the database and the funding situation will affect the schedule for entering all backlogged data in the database.

13. ACTIVITIES PLAN

The following activities are planned for the next reporting period:

- a. Data analysis
- b. Preparation for Fall Meeting
- c. Addressing data pooling concerns

14. PREPARER

This report was prepared by Crystal H. Newton, Project Engineer

Telephone: (215) 542-8400
Facsimile: (215) 542-8401
Electronic mail: crystal@bwr.com

15. APPENDICES

- A. Summary of Project Briefing, 23 August 1994



APPENDIX A



**BRIEFING/REVIEW MEETING
IMPLEMENTATION OF THE MILITARY HANDBOOK 17
FOR POLYMER MATRIX COMPOSITES AND
METAL MATRIX COMPOSITES**

Meeting Date: 23 August 1994
Minutes Submitted: 25 August 1994

Contract No. DAAL01-93-C-4064

Technical Progress Report
MSC TPR 3447/CA07

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Attn: AMSRL-MA-S (Mr. Edward Clegg), 405 Arsenal Street, Watertown, MA 02172-0001.

Submitted By:

Crystal H. Newton
Principal Investigator

A handwritten signature of Crystal H. Newton, written in dark ink, positioned below the printed name and title.

Prepared For:

Department of the Army
U.S. Army Research Laboratory
Arsenal Street
Watertown, MA 02172-0001

Suite 250, 500 Office Center Drive, Fort Washington, PA 19034
Tel: 215-542-8400 Fax: 215-542-8401

DAAL01-C-93-4064 Briefing
Army Research Laboratory - Watertown
23 August 1994

MINUTES

1. The meeting began at 10:20 a.m.
2. The outline of the meeting booklet was reviewed. The booklet will go to the ARL print shop the week of Labor Day. MSC will send information for the booklet to ARL on August 31. The following sections of the meeting booklet were considered in detail.
3. Purpose and objective statement. The handbook purpose and objective statements, to be included on the inside front cover of the meeting booklet, were refined.
4. Agenda of the executive (working group chairmen's) meeting
 - a. Changes in working groups were discussed. The Harmonization working group is, at least temporarily, not functioning. The braiding and filament winding groups have combined with co-chairs Don Jaklitsch and Vic Montuori. (If Vic Montuori doesn't continue in this role, Phil Wheeler is available as a back-up.) A co-chair will be sought for Data Review. Bruce Fink, ARL currently at U. Del., is a possibility. Agendas have been received from all working groups except Statistics, Supportability, and the Braiding component of the combined Braiding/Filament Winding working group. Crystal Newton will continue trying to get these agendas until August 31 when the information will be sent to ARL.
 - b. Crystal Newton will handle Progress, Milestones, and Agenda Items. MSC will distribute the executive agenda to the working group chairs and request them to prepare to discuss and identify milestones for their working group and to provide descriptions and completion dates for their handbook agenda items.
 - c. Crystal Newton will cover Intersociety Forum Planning.
 - d. Letters of appreciation. This topic was added to the executive agenda. Ed Clegg will review the existing award/certificates file and draft one or more examples for review during the executive meeting. Letters of appreciation for working group chairmen and formerly active participants who have retired will be considered.
 - e. Stress-strain curves will be discussed at the executive session during the working group discussions. Crystal Newton will prepare viewgraphs and a white paper highlighting the needs, problems, and potential working group responsibilities. The concerns include the fitting method, censoring of data due to partial data sets, and premature detachment of strain gages, failure points, and confidence limits. Resources available include effort by Alex Gutierrez and the NIST DATAPLOT software.
 - f. Data prioritization. Responsibility for data prioritization will be discussed during the working group discussions item at the executive meeting.

5. Session schedule. Bernie Hart will modify the session schedule to show the Wednesday morning data review session as restricted to U.S. citizens and green card holders.
6. Working Group Objectives. Short descriptions of working group objectives have been prepared by Gary Hagnauer. Information will be added for the Thick-Section Composites working group and the descriptions will be included in the meeting booklet.
7. The agenda for the general session was established. The general session will be renamed to indicate its focus on polymer matrix composites.

8:00 - 8:15 Welcome and Introductory Remarks - Gary Hagnauer/Joe Soderquist

8:15 - 8:30 Handbook Status - progress, milestones, plans for revision - coordinated between Crystal Newton and Bernie Hart

8:30 - 11:00 Working Group Reports - Gary Hagnauer

11:00 - 11:45 Agenda Items - review of process, open/close items - Gary Hagnauer to introduce, Crystal Newton

11:45 - 12:00 Site selection - Joe Soderquist/Gary Hagnauer

8. MIL-HDBK-MMC Agenda. The agendas for the MMC sessions and the session schedule were reviewed. On Thursday afternoon, the MMC participants may attend the Intersociety Forum. A room will be available for discussions by anyone who does not attend the forum. The MMC coordination meeting on Friday is now scheduled to be completed by noon.
9. Ceramic matrix composites. The eventual development of a ceramic matrix composites handbook was discussed. CINDAS is currently planning a workshop on CMC. The CMC handbook may contain information on discontinuous fiber reinforced materials as well as continuous fiber reinforced materials.
10. Publication schedule. The next release of the handbook was discussed. A revision of all three volumes is planned incorporating revisions in the handbook outline approved by the Reno meeting. This revision should be ready for DoD coordination review by July - October 1995. Crystal Newton will present changes where material is moved from one chapter to another during the executive meeting. The need for approval of chapter revisions by Reno will also be discussed. (The Materials & Processes working group has a major revision of Volume 3, Chapter 2 under consideration.) The outline included in the meeting booklet will include approved outline revisions. All approved sections not already included in the handbook are being prepared by MSC and will be submitted to ARL on diskette. This includes sections approved from review of the Portland, Alexandria, and Monterey proceedings, and a January 1993 newsletter.

11. Data Review.
 - a. A regression workshop has been suggested by Sam Garbo and Joe Soderquist. Doug Ward may have data that can be used. Crystal Newton will put together a conference call of Bob Pasternak, Doug Ward, John Adelman, and Mark Vangel to determine if a workshop should be held, when (preferably during the day in New Orleans), and if anyone else should be involved.
 - b. Data pooling is being considered by a task group. A conference call has been scheduled for 25 August with possible dates for a meeting identified as September 12 - 14, if a meeting is necessary.
 - c. Vought has requested a letter notifying them that their data (AS4/3502) has been approved. Bernie Hart will send the letter drafted by Crystal Newton.
12. Export Control. The review of the export control status for data sets that have been received but not yet approved should begin. Gary Hagnauer will get back to Crystal Newton on this topic.
13. MMC activity. The secretariat contract was reviewed for references to MMC effort. While the scope includes MMC activities, that work has lower priority than support of the polymer matrix coordination group, handbook development, and data analysis. The proposal by MMCIAC and MSC provided to Jerry Persh includes secretariat activities for MMC. The proposal assumes secretariat tasks would be funded through the contract DAAL01-C-93-4064.
14. Proceedings. MSC will prepare and distribute the proceedings from the September Coordination Group meeting. The possibility of MSC preparing and distributing the meeting booklet for future meetings was discussed.
15. Other information exchanged. The Coast Guard (DOT) will send a lieutenant commander. The navy has an interest in flammability that should be considered. The possibility of putting together a cohesive group, from the fragmentary groups such as Cecil Schneider's, with the objective of congressional or major departmental funding should be considered. The IAC's are a possible contracting channel for this effort.
16. The meeting closed at 3:05 p.m.

Attendees:

Bernie Hart, Kathy Bamberg, Bob Pasternak, Ed Clegg, Gary Hagnauer, Crystal Newton

Documents Transferred:

Agenda package - distributed by Crystal Newton

**John Bode package on testing thick sections including photographs - provided by
Bernie Hart to Crystal Newton**

**AS4/3502 data reports - provided by Crystal Newton to Bernie Hart and Bob
Pasternak**

Alexandria MMC minutes - provided by Gary Hagnauer to Crystal Newton

MMC session agendas - provided by Gary Hagnauer to Crystal Newton

Meeting booklet outline - distributed by Gary Hagnauer

Working group descriptions - distributed by Gary Hagnauer

Handbooks purpose and objectives - distributed by Gary Hagnauer

MEETING BOOKLET

COVER: logo - "Composite Materials Military Handbook"
Coordination Meeting
20-23 September 1994
New Orleans, Louisiana.

INNER FRONT COVER: Objective and Description Statements

TABLE OF CONTENTS:

Military Handbook-17 (Polymer Matrix Composites)

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 - Braiding and Filament Winding
 - Data Review
 - Guidelines
 - Materials and Processes
 - Statistics
 - Joining
 - Supportability
 - Testing
 - Thick Section Composites
- Agenda - Coordination Meeting
- Agenda Items
- MIL HDBK-17 Outline

Military Handbook-MMC (Metal Matrix Composites)

- Agenda - MMC Meeting
- Working Group Session Schedule
- Coordination and Technical Working Groups
 - Materials & Processes
 - Data Documentation
 - Testing, Design & Analysis
- Working Group Chairs

Intersociety Forum - Agenda

Preliminary Attendance List

Handbook Chairpersons, Coordinator and Secretariat

**COMPOSITE MATERIALS
STANDARDIZATION
MILITARY HANDBOOKS**

**THE OBJECTIVE IS TO PROVIDE STATISTICALLY-
BASED CHARACTERIZATION DATA ON CURRENT AND
EMERGING CONTINUOUS FIBER-REINFORCED
COMPOSITE MATERIALS WITH GUIDELINES FOR
TESTING AND FOR THE ANALYSIS, PRESENTATION,
AND UTILIZATION OF DATA.**

**THE HANDBOOKS ARE PRIMARY, AUTHORITATIVE
SOURCES FOR DOD-APPROVED, STATISTICALLY-
BASED CHARACTERIZATION DATA REFLECTING THE
BEST AVAILABLE DATA AND TECHNOLOGY FOR
TESTING AND ANALYSIS AND INCLUDING
GUIDELINES FOR DATA DEVELOPMENT AND USAGE.**

AGENDA
MILITARY HANDBOOK-17
EXECUTIVE (WORKING GROUP CHAIR) MEETING
New Orleans, LA
Monday, 19 Sep 94
1:00-5:00 pm

1. Introduction
 - Meeting Arrangements
 - Changes in Working Groups
2. MIL-HDBK-17 Status Report
 - Handbook Revision
 - Progress and Milestones
 - Agenda Items
3. Working Group Discussion
 - Braiding & Filament Winding
 - Data Review
 - Guidelines
 - Materials & Processes
 - Statistics
 - Joining
 - Supportability
 - Testing
 - Thick Section Composites
4. Intersociety Forum Planning
5. Promotion of Handbook
6. Letters and Certificates of Appreciation
7. Preparations for Reno, NV Meeting (27-30 March 95)
8. New Business

POLYMER MATRIX COMPOSITES MILITARY HANDBOOK-17 TECHNICAL WORKING GROUPS

BRAIDING AND FILAMENT WINDING WORKING GROUP

Offers guidance with respect to design, analysis, testing and manufacturing methodologies related to braided and filament wound composite materials.

Currently, the Working Group is developing braiding orientation code tables and a section on braiding test methods. Definitions of terms related to filament winding are being reviewed and the section on filament winding test methods is being updated. Also, an effort has been initiated to develop a section on netting analysis.

DATA REVIEW WORKING GROUP

Establishes data documentation requirements, develops formats for data presentation, and provides the final technical and editorial review of all data prior to inclusion in the Handbook.

Data documentation guidelines are currently under review. Recently received data will undergo review for documentation in the Handbook. Procedures for data normalization and real world statistics simulation are being considered.

GUIDELINES WORKING GROUP

Develops and documents generic guidance information and data which is essential for the adequate design, certification or qualification, and production of composite parts and assemblies. The Guidelines Working Group also provides leadership and recommendations regarding the scope, responsibilities, and future direction of the Handbook.

The current focus is on characterization test procedures and philosophy, materials property data, statistical analysis requirements, general design and analysis methodology, design data usage and quality assurance practices.

MATERIALS & PROCESS WORKING GROUP

Provides guidelines, descriptions and case studies of material types and processing options for the characterization and fabrication of polymer matrix composite materials.

Current efforts are focused on revising Volume 3, Chapter 2 (Materials & Processes), preparing a new section in Volume 1, Chapter 2 which addresses test planning, and establishing guidelines for qualification of composite materials.

STATISTICS WORKING GROUP

Analyzes and/or develops statistical procedures for composite materials evaluation and quality control, and provides other statistical support to the Handbook as directed by the Guidelines Working Group.

Plans are underway to incorporate MIL HDBK-17 statistical procedures into NIST's DATAPLOT program. Criteria are being established for batch acceptance and REGTOL, a code for developing design allowables using regression, will be considered for use in data pooling.

STRUCTURAL JOINTS WORKING GROUP

Offers guidance pertaining to the design, test evaluation, and analysis of bolted and bonded joints. In particular, the Working Group provides guidelines for obtaining test design values that have statistical significance for composite materials (Volume 1), promotes the generation of actual data to specified requirements (Volume 2), and documents analyses and design methodology to foster good design practices that result in structures having the required structural integrity (Volume 3).

Currently, sections on data documentation requirements are being developed and draft sections on Mechanically Fastened Joints and Adhesive Characterization are being reviewed.

SUPPORTABILITY WORKING GROUP

Provides guidelines dealing with repair of composite structures and the design of composite structures to facilitate repair.

A chapter on Supportability (Volume 3, Chapter 8) is being developed. The outline for Chapter 8 has been revised and new sections on Inspectability, Design for Supportability, Material Selection, and Damage and Tolerance are under development.

TESTING WORKING GROUP

Offers descriptive and guidance information relating to the usage of chemical, physical and mechanical test methods for polymer matrix composites and their constituents.

Currently, sections on failure modes, matrix test methods, prepreg characterization, tensile testing, damage tolerance testing, multi-axial testing, strain measurement, glass transition temperature, void volume analysis, and density determination are being prepared or rewritten (Volume 1, Chapters 4, 5 and 6).

THICK SECTION COMPOSITES

Provides guidance on design, analysis, and testing methodology associated with the unique characteristics of fiber reinforced polymer matrix composites that exhibit 3-D stress states.

A chapter on Thick Section Composites (Volume 3, Chapter 7) is being developed. Recently, the outline for Chapter 7 was restructured to incorporate four Demonstration Problems and a section on Process Analysis Methods.

AGENDA

**POLYMER MATRIX COMPOSITES
MILITARY HANDBOOK-17
COORDINATION MEETING**

New Orleans, Louisiana
Thursday, 22 September 1994
8:00 am - 12:00 noon

- | | |
|-------------|--|
| 8:00-8:15 | Opening Statements |
| 8:15-8:45 | Handbook Status |
| 8:45-11:00 | Working Group Reports
Braiding and Filament Winding
Data Review
Guidelines
Materials and Processes
Statistics
Joining
Supportability
Testing
Thick Section Composites |
| 11:00-11:45 | Agenda Items |
| 11:45-12:00 | Meeting Site Selection |

AGENDA

MILITARY HANDBOOK-MMC MEETING New Orleans, LA

Coordination Group Meeting - Part 1 21 September 94 (1:00 - 5:00 pm)

1. Introduction
2. Objectives and Milestones
3. Standardization Coordination Process
4. DDR&E Perspective (J. Persh)
5. NADIBO Program (R. White)
6. Summary Report of Previous Meetings
7. Action Items
8. Status of Handbook
9. Integrated Database Development
10. Installation of Working Groups
 - Materials & Processes (J. Wells, J. Cornie)
 - Data Documentation & Review (H. Berkowitz, E. Baker)
 - Testing, Design & Analysis (S. Johnson, R. Tucker, I. Snell)
11. Open Discussion
12. Meeting Schedule

Technical Working Group Sessions 22 September 1994 (8:00 am - 5:00 pm)

1. Materials and Processes
2. Data Documentation and Review
3. Testing, Design and Analysis

Coordination Group Meeting - Part 2 23 September 94 (8:00 am - 12:00 noon)

1. Introduction
2. Working Group Reports
 - Materials & Processes
 - Data Documentation
 - Testing, Design & Analysis
3. Agenda Items
4. Open Discussion
5. Remarks - Preparation and Distribution of Minutes
6. Plans for Future Meetings

**METAL MATRIX COMPOSITES
MILITARY HANDBOOK
COORDINATION AND TECHNICAL WORKING GROUPS**

COORDINATION GROUP

The Coordination Group is open to all government and non-government participants. The Group oversees development of the Handbook; makes recommendations regarding scope, responsibilities, and future direction; monitors Technical Working Group activities; and provides consensus review and approval of all information and data prior to final DoD coordination and publication of the Handbook.

MATERIALS AND PROCESSES WORKING GROUP

The objectives of the Materials and Processes Working Group are to provide guidelines, descriptions, and case studies of material types and processing options for the selection, characterization, and fabrication of fiber-reinforced metal matrix composite materials and to oversee the preparation of related sections for the Handbook.

DATA DOCUMENTATION AND REVIEW WORKING GROUP

The Data Documentation and Review Working Group establishes data documentation requirements, develops formats for data presentation, guides data selection, and provides final technical and editorial review of all data prior to inclusion in the Handbook.

TESTING, DESIGN AND ANALYSIS WORKING GROUP

The Testing, Design and Analysis Working Group provides descriptive and guidance information relating to the usage of chemical, physical and mechanical test methods for continuous, fiber-reinforced metal matrix composites and their constituents. The Working Group also offers guidance pertaining to the design, test evaluation and analysis of specific or unique fiber-reinforced metal matrix composite materials forms and structures.

MILITARY HANDBOOK-MMC COORDINATION MEETING

New Orleans, LA

Wednesday, 21 September 94

1:00-5:00 pm

AGENDA

1. Introduction
2. Objectives and Milestones
3. Standardization Coordination Process
4. DDR&E Perspective (J. Persh)
5. NADIBO Program (R. White)
6. Summary Report of Previous Meetings
7. Action Items
8. Status of Handbook
9. Integrated Database Development
10. Installation of Working Groups
 - Materials & Processes (J. Wells, J. Cornie)
 - Data Documentation & Review (H. Berkowitz, E. Baker)
 - Testing, Design & Analysis (S. Johnson, R. Tucker, I. Snell)
11. Open Discussion
12. Meeting Schedule

MILITARY HANDBOOK-MMC COORDINATION MEETING

New Orleans, LA

Friday, 23 September 94

8:00 am - 12:00 noon

AGENDA

1. Introduction
2. Working Group Reports
 - Materials & Processes
 - Data Documentation
 - Testing, Design & Analysis
3. Agenda Items
4. Open Discussion
5. Remarks - Preparation and Distribution of Minutes
6. Plans for Future Meetings